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Quantifying the area-at-risk of myocardial infarction in-vivo using arterial spin labeling cardiac magnetic resonance

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Abstract

© The Author(s) 2017. T 2 -weighted cardiovascular magnetic resonance (T 2 -CMR) of myocardial edema can quantify the area-at-risk (AAR) following acute myocardial infarction (AMI), and has been used to assess myocardial salvage by new cardioprotective therapies. However, some of these therapies may reduce edema, leading to an underestimation of the AAR by T 2 -CMR. Here, we investigated arterial spin labeling (ASL) perfusion CMR as a novel approach to quantify the AAR following AMI. Adult B6sv129-mice were subjected to in vivo left coronary artery ligation for 30 minutes followed by 72 hours reperfusion. T 2 -mapping was used to quantify the edema-based AAR (% of left ventricle) following ischemic preconditioning (IPC) or cyclosporin-A (CsA) treatment. In control animals, the AAR by T 2 -mapping corresponded to that delineated by histology. As expected, both IPC and CsA reduced MI size. However, IPC, but not CsA, also reduced myocardial edema leading to an underestimation of the AAR by T 2 -mapping. In contrast, regions of reduced myocardial perfusion delineated by cardiac ASL were able to delineate the AAR when compared to both T 2 -mapping and histology in control animals, and were not affected by either IPC or CsA. Therefore, ASL perfusion CMR may be an alternative method for quantifying the AAR following AMI, which unlike T 2 -mapping, is not affected by IPC.

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